DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3, 6-11, 12-14, 17-23, 25-28, 29-31, 34-44 and 46-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diekmann et al. (RF-SQUID to DC-SQUID upgrade of a 28-channel magnetoencephalography (MEG) system) in view of Weitschies et al. (Magnetic Marker monitoring of disintegrating capsules).

3. Diekmann et al. (hereinafter Diekmann) teaches a method for calibrating a sensor array (Abstract; Figs. 1-7; Tables 1-2), the sensor array including a plurality of sensing elements (Abstract; pg. 845, 2.1. Hardware), the method comprising: applying a sinusoidal excitation to at least one and less than all of the plurality of sensing elements, e.g. a calibration subset, of the sensing array (pg. 846, 2.2. Calibration; pg. 846, 2.3. Elimination of crosstalk; pg. 846, 2.5. Calibration of cryostat position); analyzing the output of some or all of the plurality of sensing elements resulting from the excitation (pg. 846, 2.2. Calibration; pg. 846, 2.3. Elimination of crosstalk; pg. 846, 2.5. Calibration of cryostat position); repeating the excitation and analyzing process for at least one of the plurality of sensing elements (pg. 846, 2.2. Calibration; pg. 846, 2.3. Elimination of crosstalk; pg. 846, 2.5. Calibration of cryostat position); and determining corrections to a sensed signal based upon the analyzed outputs of the plurality of sensing elements (pg.

846, 2.2. Calibration; pg. 846, 2.3. Elimination of crosstalk; pg. 846, 2.5. Calibration of cryostat position). Diekmann goes on, teaching that each sensing element has a corresponding preamplifier wherein the corresponding preamplifier reduces capacitive loading on each sensing element (Abstract; Fig. 1, 3; pg. 845, 2.1. Hardware; pg. 847, Modification of the SQUID electronics). Diekmann further teaches the use of a preamplifier and provides an input current through the preamplifier, which causes induced voltages in nearby sensors (Fig. 3; g. 847, Modification of the SQUID electronics: Here, the examiner stands that it is inherent that the input current would provide a voltage drop across the coils).

7. Diekmann does not expressly teach that the sensing array is used and configured for marker localization. Diekmann also does not expressly teach that the corrections are applied to the outputs of the sensing array during marker localization. Diekmann also does not expressly teach that the calibrating method is interleaved between marker localization operations.

8. In the same field of endeavor, Weitschies et al. (hereinafter Weitschies) teaches tracking the gastrointestinal transit of a magnetically marked capsule using a SQUID magnetometer and a calibration model (Abstract; pgs. 413; Fig. 4). Here, the examiner stands that interleaving calibration between separate marker localizations would be obvious to improve the accuracy of the system for each marker localization operation.

9. It would have been obvious to modify the calibration of a SQUID sensor array of Diekmann in view of the use of a SQUID sensor array for marker localization of

Weitschies. The motivation to modify Diekmann in view of Weitschies would have been to improve utility of any SQUID array in a known manner.

10. Claims 4-5, 15-16, 24, 32-33 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Diekmann et al. (RF-SQUID to DC-SQUID upgrade of a 28-channel magnetoencephalography (MEG) system) in view of Weitschies et al. (Magnetic Marker monitoring of disintegrating capsules) as applied to claims 2, 13, 21, 30, 43 above, and further in view of Granata et al. (Integrated LTc-SQUID magnetometers for multichannel systems).

11. Diekmann in view of Model teaches all the limitations of the claimed invention except for expressly teaching the use of a differential amplifier having first and second amplification elements.

12. In a related field of endeavor, Granata et al. (hereinafter Granata) teaches a dc-SQUID with lowered noise operation (Abstract; Figs. 1-6). Here, Granata teaches a dc-differential amplifier in front of a first stage amplifier (pg. 97, IV. Device Performance).

13. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the amplifier of Diekmann in view of Weitschies with the multiple amplifiers of Granata. The motivation to modify Diekmann in view of Weitschies with Granata would have been to use known amplification elements to reduce amplification noise, as taught by Granata.

Response to Arguments

14. Per Applicant's request, the Examiner attempted to contact Susan Betcher on 10/12/2011 prior substantive action. However, a voicemail indicated that Susan Betcher would be away thru 10/12/2011 on client meetings.

15. The Examiner will explain the above grounds of rejection in order to facilitate the appropriate amendments to move the case toward allowance. The Examiner maintains that the present amendment “the sensing array is configured to detect a marker” does not overcome SQUID MEG system of Diekmann in view of the teachings of Weitschies for using a multi-channel SQUID device to track magnetic markers. That is the Calibration and noise suppression of a SQUID system is disclosed by Diekmann. Diekmann does not disclose that the SQUID system is used to detect a marker. However, in the same field of endeavor, Weitschies discloses using a similar SQUID system to track magnetic markers (Introduction). That is, the present invention merely calls for calibrating a sensing array. The claimed sensing array does not require tracking an implantable marker, limitations which have been previously allowed. Specifically, the scope of ‘used for marker localization’ and even the presently amended ‘configured to detect a marker’ does not require using the sensing array to wirelessly track an *implanted resonant* marker, a feature that the examiner acknowledges as novel and not obvious over the applied references. That is, the claims merely call for calibrating a sensing array. As addressed herein, the SQUID sensor array of Diekmann in view of Weitschies is configured to track a magnetic marker.

16. Diekmann discloses a method to calibrate a magnetoencephalography (MEG) system (Abstract; Introduction; 2.2. Calibration). “The MEG system comprises two cryostats which can be positioned independently of each other. Each cryostat contains 14 magnometer channels and an array of 16 support channels. A further cube (‘compensation cube’) is situated above each array.". Thus, the calibration cube is part of the sensing array. This is similar to the present system described in Figure 2 (ref. 102). Thus, an 8Hz excitation signal is applied to the compensation cube, referred hereafter as the excitation subsystem of the MEG system. This 8Hz excitation signal is detected by neighboring pickup coils i, j (See Fig. 2, 2.3. Elimination of crosstalk). The pickup coils i,j will hereafter be referred to as sensing subsystem. This excitation results in two types of crosstalk between the channels in the sensing subsystem: 1. Crosscoupling & 2. Backward coupling. Each crosstalk is calibrated by the calibration steps 2.2 and 2.3. Additionally a calibration for position is performed for the cryostat position where, the 30 coils are sequentially energized and the resulting fields are measured by all channels in the sensing subsystem (2.5 Calibration of cryostat position). Diekmann goes on, disclosing that these calibration steps are performed over eight periods (4.3).

17. For the purposes of facilitation prosecution, the Examiner suggests amending a limitation into the independent claims that requires tracking a resonant marker. That is, the Examiner stands that amending a positive limitation that requires that “implanted resonant markers are detected by the sensing array” would facilitate allowance.

Conclusion

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ELLSWORTH WEATHERBY whose telephone number is (571)272-2248. The examiner can normally be reached on M-F 8:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long Le can be reached on (571) 272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/EW/

/LONG V. LE/
Supervisory Patent Examiner, Art Unit 3768